

# **Acquisition Plan**

**for**

## **Digital Document Storage (DDS)**

## **Prototype System**

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**Acquisition Plan**  
**for**  
**Digital Document Storage (DDS)**  
**Prototype System**

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## **BACKGROUND/INTRODUCTION**

NASA Headquarters maintains a continuing interest in and commitment to exploring the use of new technology to support productivity improvements in meeting service requirements tasked to the NASA Scientific and Technical Information (STI) Facility, and to support cost effective approaches to the development and delivery of enhanced levels of service provided by the STI Facility.

In pursuit of this interest and commitment, NASA Headquarters directed the establishment of the Digital Document Storage (DDS) project through a September 8, 1988, change order to contract NASW-4070. The DDS project has received additional NASA technical direction through the following Technical Directives (TDs):

- TD 87-068 Full Text Processing, Storage, and Retrieval
- TD 88-061 Digital Document Storage
- TD 89-006 Facility Management Reporting

To complement these TDs, NASA Headquarters has issued a series of Task Assignments (TAs) through which the Level of Effort (LOE) hours to the project have been assigned and directed. These TAs include:

- TA 89-32 Full Text Storage
- TA 89-44 Digital Document Storage
- TA 90-24 Digital Document Storage
- TA 90-31 Digital Document Storage (DDS) Project

NASA Headquarters' objectives and scope for the fully implemented DDS Project are the following:

1. Provide improved archival blowback quality and service for ad hoc requests for paper copies of documents archived and serviced centrally at the STI Facility. Develop an operating capability to scan, digitize, store and reproduce in paper media copies of 5,000 NASA technical reports archived annually at the STI Facility and serviced to the user community.
2. Provide NASA Headquarters and field installations with on-demand, remote, electronic retrieval of digitized, bilevel, bitmapped report images along with branched, nonsequential retrieval of report subparts listed in Tables of Contents. Develop an operating capability for a remote, electronic NASA Technical Report retrieval system.

The primary reason for investigating an alternative to the current microfiche- and paper-based method of providing copies of NASA Technical Reports is directly related to the needs of NASA users for higher-quality document reproduction and improved turn-around of document requests.

These DDS objectives are based upon a belief that digitizing NASA Technical Report pages can provide a platform for improving the quality and timeliness of current STI Facility services. Specifically, it is expected that through use of a DDS system the following service improvements can be achieved:

- perceptible, higher quality reproductions of NASA Technical Report pages
- reduced turnaround times associated with STI Facility processing of requests for reproductions of NASA reports
- reduced turnaround times associated with local, NASA Center processing of requests for reproductions of NASA reports
- improved access to subparts of NASA Technical Reports through selective retrieval and printing of individual subparts, such as chapters and other subparts listed in Tables of Contents

Currently, the STI Facility services requests for copies of NASA Technical Reports from NASA, NASA contractors, foreign organizations, non-NASA contractors, U.S. Government agencies and their contractors, and other organizations in the U.S. Although the number of requests, and the resultant number of pages printed to satisfy these requests, vary from year to year, meeting reproduction requests for unclassified NASA reports averaged 4,059 requests and 539,504 printed pages per year during calendar years (CY) 1987 and 1988. It is anticipated that the majority of these requests could be met with a 60% improvement in average turnaround time and with considerably higher quality reproductions once the DDS system is fully implemented at the STI Facility. Once DDS is implemented at all the NASA Centers, turnaround time for copies of reports can be reduced even further, down to minutes instead of days.

Alternatives to digitizing NASA Technical Report pages at the STI Facility in order to meet increased service requirements were considered; however, the alternatives varied mainly in the

method for obtaining digitized or electronic forms of the NASA Technical Reports. Many of the NASA Technical Reports currently are prepared and printed electronically; however, a consistently formatted version of each report is not currently provided to the STI Facility. Although in the future, report producers may be required to submit their reports to the STI Facility in a standardized electronic form, this approach to the capture of the digital or electronic format of NASA Technical Reports requires an initiative that would produce results in a much longer time period than converting the NASA Technical Reports to digital images at the STI Facility will require. The other alternative approach for converting NASA Technical Report pages to digital or electronic images involves key entry of report pages by a human operator. The key entry approach was dismissed early in the project as too labor intensive and therefore too costly.

Alternatives to on-demand, electronic document delivery to remote sites were also considered. The alternatives revolve around different electronic methods for shipping, storing and retrieving NASA Technical Report images at remote sites. Alternative approaches are identified in section 4 of the DDS Pilot Production System Cost/Benefit Analysis report delivered to NASA Headquarters on December 29, 1989.

As an early part of the DDS project, STI Facility staff performed a technical assessment of digital imaging technology, including optical disk and other enabling technologies. This assessment was documented in the DDS Digital Imaging Technology Assessment report delivered to NASA Headquarters on August 7, 1989. In this report, STI Facility staff strongly urged NASA consideration for both Prototype and Pilot Production Systems prior to Full-Scale System implementation.

### Planned Methodology

A two-stage procurement is necessary to acquire, test, and ultimately place into production the DDS system (see figure 1 below). The first stage, which requires a separate procurement, involves the DDS Prototype System. In this stage, scheduled to last one year, the Prototype System will be used for testing and for determining specifications for the production system. The second stage, which also requires a separate procurement, involves the implementation and operation of a DDS production-level system. This system is composed of two phases: the Pilot Production System phase (scheduled to last five years) and the Full-Scale System phase (also scheduled to last five years). The Pilot Production System will be a fully functional DDS system, but remote access will be limited to a single remote site: NASA Headquarters. The Full-Scale Production System will expand DDS services to 16 selected NASA sites as outlined in section 3.1.2 of the DDS Full-Scale System Impact Analysis report.

The purpose for the Prototype System, which will have only a one-year life cycle at the STI Facility, is to facilitate further investigation of the technology and to develop specific require-

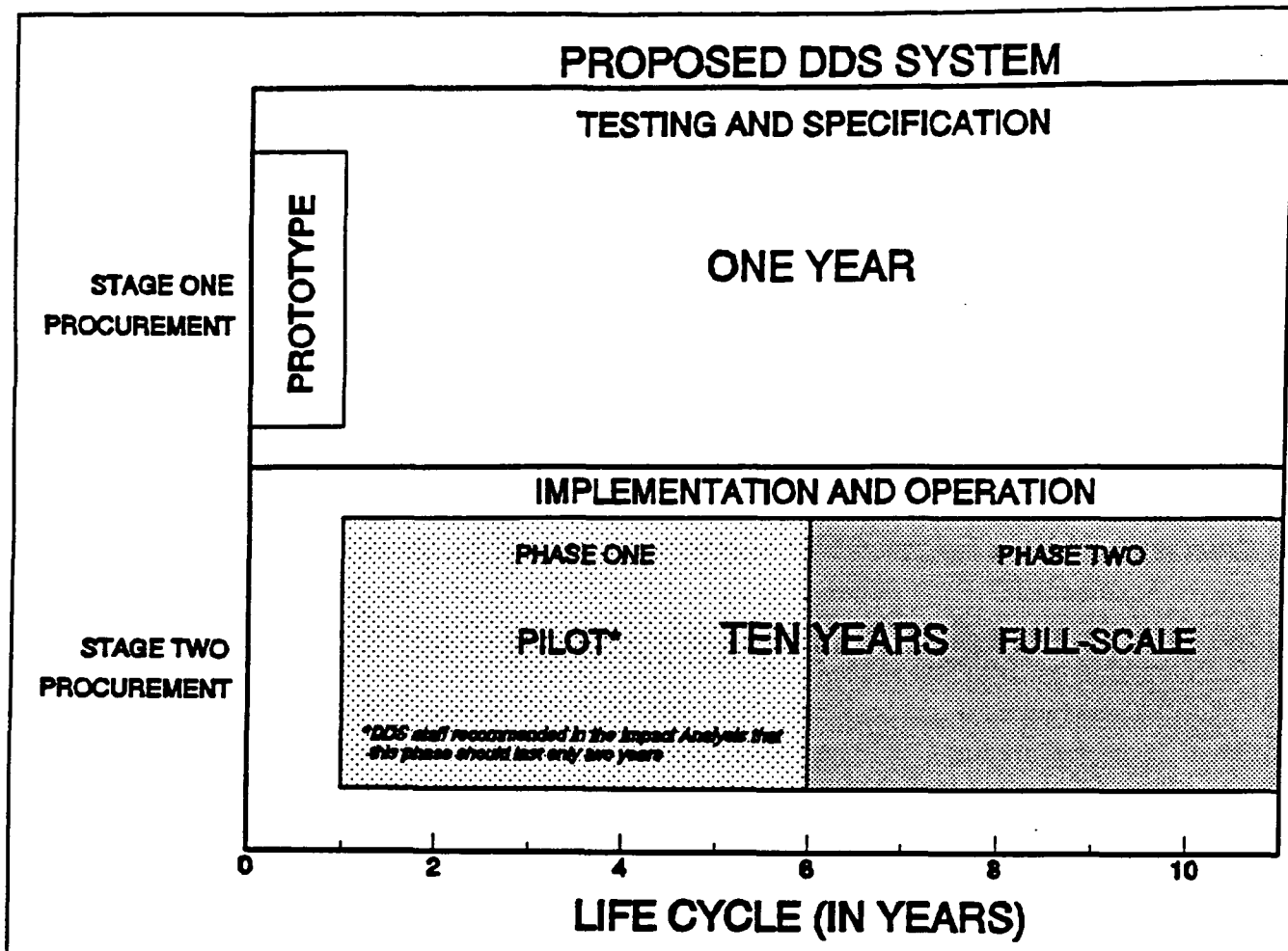


Figure 1. The two procurement stages for the proposed DDS System.

ments for the Pilot Production System. Procurement of the Prototype System is necessary to determine the specifications for the Pilot Production System. The most important element to ensure the success of the proposed DDS system is to evaluate the labor impacts and document volume throughput using the Prototype System.

The purpose of the Pilot Production System is to validate the specifications identified by the Prototype System. Once the specifications have been validated, which could include modifications to the Pilot Production System, the Full-Scale System can be implemented to provide full functionality to NASA users.

In the Digital Imaging Technology Assessment report, STI Facility staff also recommended use of an open-architecture approach to the DDS system. NASA Headquarters agreed to both recommendations and subsequently directed the preparation of an Acquisition Plan for a DDS

Prototype System following the configuration outlined in the Digital Imaging Technology Assessment report.

This document is the Acquisition Plan for the DDS Prototype System.

## 1. ANALYSIS OF REQUIREMENTS

### Current System

Requests to the NASA STI Facility for copies of NASA Technical Reports currently arrive through NASA/RECON electronic requests, phone orders, and the mail.

The requester may specify the requested item be provided as:

- a. Hard copy (may be filled from stock or blowback)
- b. Microfiche (microfiche reproduction required)
- c. Stock copy (no reproductions, must fill from stock)
- d. Microfiche and hard copy (both reproduced microfiche and either stock or hard-copy blowback)
- e. Microfiche or hard copy (STI Facility provides hard copy or microfiche at its option)

During 1987 and 1988, the STI Facility received 17,409 reproduction requests for NASA Technical Reports. Of these, 2.6 percent (459) could not be filled because of document unavailability, access limitations, or policy restrictions, leaving 16,950 requests that were actually processed.

The STI Facility fills document reproduction requests by providing stock copy originals, microfiche, 24:1 reproductions, 20:1 reproductions, and 1:1 copies made from hard-copy originals on a duplicating machine. Stock copy originals, microfiche, and reproduction (24:1, 20:1, and 1:1 reproductions collectively) accounted for 51.8, 8.1, and 40.1 percent, respectively, of the request volume over the referenced two-year period.

The portion of the workload that resulted in paper reproduction (namely 24:1, 20:1, and 1:1 reproductions) represented 8,119 requests (7,520 actual requests adjusted for multicopy activity). The 8,119 requests resulted in the generation of 1,079,008 pages at an average of 133 pages per requested NASA Technical Report. On an annual basis this equates to an average of 4,059 requests and 539,504 pages per year of printed paper reproduction volume. It is this paper reproduction workload that alternatively can be accommodated via the proposed DDS system.

The desired document must be manually located in the microfiche storage room, pulled from the file, taken to the duplicating room, and copied on a Tameran 1970 microfiche-to-paper



printer. If the order is for only one or two copies, both are produced on the Tameran. If numerous copies are required, only the first is produced on the Tameran and Xerox copies are then produced on a Xerox 5090. The microfiche is then manually refiled and the document forwarded to the mailroom for distribution. If the desired document cannot be located in the microfiche collection, a 1:1 reproduced copy is produced using the Facility case file for the document. Requests that can be satisfied from inventory stock are manually processed by the Facility's Document Storage staff. In some cases, NASA requires that a specified number of copies be reserved in inventory. In the case that a document request would reduce the on-hand stock inventory below the reserve level, NASA must approve filling the order from stock. Hard-copy orders that cannot be filled from stock are forwarded to the Facility's reprographics department for blowback from microfiche. Since 1989, if a requester requires that all pages containing functional color be supplied with color, Facility staff will apply special procedures to incorporate pages reproduced in color into copies reproduced from microfiche or the original case file.

The orders are validated before the copying process and again before binding. A final quality-assurance review is performed prior to packaging and mailing. Despite labelling of reproduced report pages as best available copy, recipients of these copies occasionally express their discontent with the quality of the reproduced pages.

Current average turnaround time for STI Facility processing of requests, measured as the length of time between arrival at the Facility and departure from the Facility, is five working days. The length of time between Facility shipment of a report and the requester's receipt of the report varies due to the vagaries of mail delivery and local distribution systems. It is estimated that mail delivery and local distribution often account for an additional five calendar days before the requester receives the copy of the report which was requested. Therefore, the total length of time between initiation of a request and receipt of a copy typically is ten to twelve calendar days.

### Proposed DDS System

It is expected that through use of digital imaging technology that the proposed DDS system will be capable of satisfying requests for NASA Technical Reports within minutes to NASA Centers equipped with remote electronic access equipment. For those users who do not use remote electronic access, requests for copies will be processed at the Facility with an expected turnaround time of two working days. In addition to these turnaround time improvements, use of this technology should result in significantly improved quality and legibility on copies printed to satisfy requests. This will provide enhanced blowback quality over the current microfiche treatment, especially for documents with halftone photographs, line art, or complex graphical representations. Additionally, nonsequential electronic access to report subparts listed in a

report Table of Contents will be available through use of remote access workstations. This new capability will allow remote users to view and/or print only those sections of a report in which they are interested, providing the potential for additional savings in terms of time and materials.

In order to achieve these improvements in reproduction quality and turnaround time, and to support nonsequential subpart access, a set of equipment which can be used to prototype and test current working assumptions about digital imaging technology is needed. This set of equipment would be used to develop the proposed DDS Prototype System.

### Prototype System

The DDS Prototype System will provide the basis for the analytic evaluation of system strategies centered on operational workflow—including human operators and the electronic components—and use of a DDS system to maximize derived benefits while minimizing costs. The Prototype System will enable DDS staff to test and validate the series of critical assumptions contained in the Cost/Benefit Analysis and to provide further specifications for a production-level system. Revisiting key portions of the cost/benefit comparison may be necessary, based on updated assumptions or facts resulting from the evaluation of the Prototype System. Additionally, even if current assumptions parallel test results, cost estimates for development and implementation of the Pilot Production System should be reviewed.

The following are the functional objectives of the Prototype System:

1. Assess the requirement levels for the following:
  - a. system operator functional skills/tasks for a production-level DDS system
  - b. digital imaging equipment for a production-level DDS system
2. Demonstrate digital imaging functionality with NASA Technical Reports
3. Validate or refine the following assumptions:
  - a. cost-effectiveness of the Pilot Production System
  - b. requirements for labor at lower skill levels and fewer total labor hours
  - c. improved quality for reference and blowback services
4. Establish Pilot Production System performance criteria for capacity, throughput, and other parameters unique to the processes and services at the STI Facility.

The Prototype System will be used to test and validate the reproduction and supplemental volumes based on speculation regarding the remote access scenario pertaining to use by a NASA user. Section 4.2.2 of the Full-Scale System Impact Analysis contains information to support a projected total daily volume of reproduction and supplemental requests to be 10,715 page images in year one of the Full-Scale System, and will grow to 11,715 page images in year five. The Prototype System is necessary to validate the reproduction capacities of the proposed DDS system.

The proposed DDS system must be capable of storing all documents as electronic, raster images—even those documents with nontext information, such as photographs and line drawings. Such a system combines state-of-the-art graphics, text, scanning, database and networking technologies with on-line magnetic and optical disk media. These technologies and media were reviewed and discussed in detail in the Facility Technology Assessment report. The DDS system must allow documents to be:

- stored at high densities to reduce space and storage/retrieval costs
- permanently and securely archived
- retrieved rapidly
- filed using cross-indexing
- always available for use
- made more secure from media deterioration
- supplied electronically to end users

### Prototype System Configuration

The configuration of the Prototype System distributes functions among multipurpose workstations connected to each other through a local area network (LAN). The DDS workstations are considered physical subsystems in that each workstation, to a large extent, provides distributed processing in a stand-alone fashion. Document images are captured page-by-page in the image capture subsystem via the primary document scanner. When a batch of page images, a partial or complete document, is released to the quality control subsystem, there will be verification against the original hard-copy pages to insure completeness. Image enhancement, rescanning, or rejection of specific images may occur prior to release of the page images for temporary storage on the rewritable optical disk at the quality control workstation. When a group of documents has been reviewed they will be released for permanent storage in the document reproduction/file server/ retrieval subsystem. In this same subsystem page images for a requested document will be retrieved in the correct sequence for printing on the high speed laser printer.

The workstations will be based around a microcomputer built upon an Intel 80386 microprocessor. The system must be capable of executing specialized image processing software. The functionality of each workstation will be determined by the specific combination of software, add-in boards, and peripheral devices it uses. The Prototype System implementation will contain three such multipurpose workstations: (1) Image Capture Workstation, (2) Quality Control/Image Enhancement Workstation and (3) Combination Reproduction/Document File Server/Image Retrieval Workstation. A proposed configuration for the DDS Prototype System is presented in Attachment 1.

### **1.1 Image Capture Workstation**

The Image Capture Workstation will serve as the front-end station of the digital imaging system. Its primary function is to convert hard-copy NASA Technical Reports into an electronic, digitized form that subsequently can be maintained, stored, displayed, and printed by operators on the other workstations.

### General Requirements

The Image Capture Workstation is designed to be the primary workstation for the conversion of printed documents to digital, raster images, i.e., electronic document filing. It must support the following functions:

1. Scan and input the database accession number stamped onto each NASA Technical Report file folder
2. Scan and digitize NASA Technical Report pages
3. Review and confirm the acceptability of digitized images
4. Validate the correspondence between digitized NASA Technical Report pages and assigned database accession numbers
5. Provide the basis for subsequent image enhancement at the Quality Control/Image Enhancement Workstation
6. Minimize the size of the image files to aid in the transfer of the images across the LAN to the Quality Control/Image Enhancement Workstation

Additionally, this workstation must be as automated as possible in order to minimize human intervention and maintain a constant throughput.

### Primary Components

The following are the primary components of this workstation:

1. PC 386/25 base unit with 150MB hard disk
2. Landscape imaging display, 1600 x 1200 pixel resolution
3. Sheetfed scanner with auto document feeder, 200 to 400 dots per inch (dpi) selectable
4. Image display/scanner interface board
5. Image processing board
6. Hand-held scanner
7. Serial mouse

### Specific Functional Requirements

The following are the functional requirements of this workstation:

1. This workstation requires an 80386-based PC control computer with a 150MB hard-disk drive.
2. A 19-inch, 1600 by 1200 pixel resolution landscape imaging monitor and software, which will display two images side by side, is required for the operator to confirm the acceptability of the scanned images, and the text application of logging the NASA Technical

Reports when processed. The monitor will be capable of displaying the entire scanned page on the screen at one time. Applicable commands, options, scanning parameters, etc., will be displayed simultaneously on a display window side-by-side with the image. Zoom capability will be available to allow the operator to display the full image as captured by the scanner.

3. A sheetfed/flatbed scanner will convert hard-copy paper images into an electronic form that can be stored, displayed, printed and passed onto the Quality Control/Image Enhancement Workstation. Because of the relatively high proportion of halftone photographs contained in NASA Technical Reports, a scanning resolution in the range of 300 to 400 dpi is required. An automatic paper feed, with a 50 to 100 sheet capacity is required to increase the scanning speed and automate the scanning process.
4. File compression is required to decrease file size for storage and communications purposes. Fast performing hardware-based compression, instead of software-based compression, is required to support the frequent compression/decompression of document images. This requirement can be satisfied using an image display/scanner interface board that includes compression/decompression components.
5. An image processing board is required for displaying and manipulating the images. It must provide the following features: anti-aliasing, auto-discrimination, dynamic thresholding, mirror functioning, overlays and outlining.
6. A hand-held scanner for multiple-font recognition of database accession numbers is required for entry of data into indexes for subsequent search and retrieval.

## **1.2 Quality Control/Image Enhancement Workstation**

The Quality Control Image Enhancement Workstation requires the same functionality as the Image Capture Workstation but at much higher resolutions and shades of gray. Additionally, this workstation will provide the opportunity to inspect, verify, dither, and enhance the images of documents before they are forwarded to be archived. The technologies involved in this process were discussed in detail in the Facility's Technology Assessment report. The process and workflow were discussed in the Facility's Cost/Benefit Analysis report.

### **General Requirements**

The Quality Control/Image Enhancement Workstation is designed to be the work site for digital image enhancement, image quality verification, and preparation of final digital images for archival storage. It must support the following functions:

1. Receive and decompress digital images from the Image Capture Workstation
2. Review and validate the quality of digitized images
3. Rescan NASA Technical Report pages
4. Manipulate and enhance digitized images

5. Index the Table of Contents page in each NASA Technical Report for subport retrieval
6. Premaster digital images for batch processing to archival media
7. Minimize the size of the image files to aid in the transfer of the images across the LAN to the Combination Reproduction/Document File Server/Image Retrieval Workstation
8. Transfer image files through facsimile technology to non-network locations

### Primary Components

The primary components of this workstation are the following:

1. PC 386/25 base unit with 150MB hard-disk drive
2. High-resolution (1,600 by 1,200), 19-inch dual page, gray scale monitor
3. Flatbed scanner with levels of gray scale, 100 to 800 dpi, selectable resolution
4. Optical Character Recognition (OCR) software
5. Image compression/decompression board
6. Image enhancement software and image display software
7. 5.25-inch rewritable optical disk drive
8. PC facsimile (fax) board
9. 9,600 bits per second (bps) modem and remote access software
10. Serial mouse

### Specific Functional Requirements

The following are the functional requirements of this workstation:

1. This workstation requires an 80386-based PC control computer. A 150MB hard-disk drive is required to buffer images from the scanner workstation. This storage capacity will expedite the verification of Table of Contents indexing for document subparts.
2. A high-resolution, dual page monitor, with a minimum capability of 16 levels of gray scale will take full advantage of additional information provided with the gray scale capture of the image.
3. A high-resolution, flatbed scanner will be used for the input of troublesome images, as well as rescanning to minimize distortion of digital images. The flatbed scanner must be able to automatically detect the difference between text and graphics. The flatbed scanner must also support true gray scale capture, in order to support subsequent image processing functions, such as image enhancement, which will be performed at this workstation. A gray scale capability of 64 levels will minimize false contour problems while facilitating enhancement through contrast/brightness filters and other image processing features. A selectable resolution range of 100 to 800 dpi is required along with at least 115 to 200 lpi halftone resolution. This scanner also provides a backup device in case of failure at another workstation.
4. Optical Character Recognition (OCR) is required to permit evaluation of its practicality for encoding document Tables of Contents and its general applicability for the document input process.

5. Image file compression and decompression is required and will be performed by an image retrieval interface board.
6. Critical functions of this station are the ability to retrieve, display, manipulate, and enhance documents. The image enhancement function is required for improving the quality of graphics and half-tone photographs presented in NASA Technical Reports in order to preserve as much visual information as possible. Software required to support this function must be capable of accessing uncompressed images, displaying an image on the workstation monitor, supporting the further processing of the image and store the enhanced image on the hard disk. This is accomplished with an image retrieval interface board, image display software and with gray scale software.
7. A 5.25-inch rewritable optical disk drive and software is required at this workstation to support premastering of digital images and batch transfer of these images to the Document File Server Workstation. Digital document images will be buffered on this device and verified before being shipped in batch to the Write Once, Read Many (WORM) optical unit on the file server. Staging this transfer of digital images will permit greater control of the LAN traffic and minimize data collisions.
8. Modems, remote access software for modems and a PC fax board will support remote transmission and retrieval during regular and off peak hours. Although remote access is not a function of the Prototype System, its testing and evaluation are crucial during this phase because it will be a significant function of the Pilot Production System.

### **1.3 Combination Reproduction/Document File Server/Image Retrieval Workstation**

This workstation will have control of the printer, the print queue, and the printing process. It will store the archive of all digitized report images and deliver electronic images when they are requested.

#### **General Requirements**

The Reproduction/Document File Server/Image Retrieval Workstation is designed to be a multifunctional workstation. It will operate as the archival repository of digitized NASA Technical Report images, and will support the retrieval of these images for display on a monitor or for reproduction on an attached printer. It must support the following functions:

1. Receive and store digital images from the Quality Control/Image Enhancement Workstation
2. Maintain and search predefined indexes
3. Retrieve digitized report images by database accession number
4. Provide both sequential and nonsequential access to digitized report pages
5. Display digitized report images
6. Print digitized report images
7. Transfer image files to other local network workstations

8. Manage the LAN
9. Support system analysis and capacity planning.

### Primary Components

The primary components of this workstation are the following:

1. PC 386/25 base unit with 3000MB hard-disk drive
2. Portrait imaging display, 800 by 1000 pixel resolution
3. 12-inch Write Once, Read Many (WORM) optical image archive and controller
4. Image display/printer interface board
5. Laser printer, 8 pages per minute (ppm) and 300 dpi
6. Compact Disk-Read Only Memory (CD-ROM) device
7. Image file server software
8. Serial mouse

### Specific Functional Requirements

The following are the functional requirements of this workstation:

1. This workstation consists of a PC control computer and is required to support side-by-side display of an image and of management data. A 150MB hard-disk drive is required to store all the database information, utility software, and provide buffering functions. Part of the magnetic disk will be required as temporary storage for images queued for output.
2. A 15-inch diagonal portrait imaging monitor is required with 800 by 1000 pixel resolution for display and verification of images before printing.
3. High-density storage, rapid access times and the preservation of data are key requirements of this workstation. A WORM optical disk drive is required to store the large image files resulting from digitizing thousands of NASA Technical Reports. The high-capacity, 12-inch WORM unit is required in order to prototype the archiving of such a large number of digital image files. This high-capacity unit is needed in the Prototype System to validate equipment use and interface assumptions. A WORM driver and host adaptor card also is required.
4. Image file compression and decompression is required and will be performed by the image/display printer board.
5. An 8-pages per minute, low-speed laser printer will support the printing of text and graphics on the same page at a high quality. A 300-dpi resolution, the same resolution as the flatbed scanner at the Image Capture Workstation, will negate the need for scaling algorithms, which can cause distortions.
6. A CD-ROM device is required to access technical information and vendor documentation.

### **1.4 Local Area Network (LAN)**



The DDS Prototype System will be an open architecture, distributed processing system based upon a local area network (LAN).

#### General Requirements

The LAN is designed to interconnect the DDS workstations while providing cost-effective resource sharing among network workstations and functions. It must support the following functions:

1. Manage and operate two-way network communications
2. Transfer large files between workstations and to modems
3. Emulate standard communications protocols
4. Validate image quality of transmitted documents.

#### Primary Components

The primary components of the LAN are the following:

1. LAN interface cards and cabling
2. 3270 emulation board and software
3. LAN software
4. Remote image reception software

#### Specific Functional Requirements

The following are the functional requirements of the LAN component:

1. To provide a high degree of modularity, configuration flexibility and processing power, and to interconnect the three DDS workstations and form the imaging system, a LAN is required.
2. Each control computer attached to the LAN will require a network interface card to allow for communication with the file server and to access software applications.
3. In addition to the network hardware, network software, such as the network operating system and network management software, will be required.
4. Remote image reception software will validate image quality from electronic documents stored in DDS and transmitted to a standard PC with a nonimaging display.
5. Database application software will accommodate network use, such as multitasking operations and simultaneous use of document files.

### **1.5 Software**

#### General Requirements

Utility software is required for the operation of the special-purpose and multipurpose workstations. The utility software must support the following functions:

1. Provide an operating environment for the computing devices
2. Control peripheral devices

3. Manage functional operations and provide an operator interface
4. Manage file storage, retrieval and backups.

#### Primary Components

The primary components of the utility software are the following:

1. Operating system software
2. Device driver software
3. Database software
4. Software integration tools

#### Specific Functional Requirements

The following are the functional requirements of the utility software:

1. An operating system is required to provide a low level interface between the hardware and application software in the control computer.
2. Device driver software is required to provide the interface between peripheral equipment and the control computer's processor to perform jobs for which the control computer was not originally designed. These drivers require customization for each peripheral and usually take the form of file system emulation or application utilities.
3. Database software is required to keep track of all the documents in the system, coordinate the operation of peripherals, and act as the operator's primary interface.
4. In addition to database management functions, database application software is required for basic storage and retrieval functions, as well as utility software, such as word processing and backup utilities.
5. Software integration tools are required to interconnect all components and devices, and to generate application software.

## **2. ANALYSIS OF TECHNICAL ALTERNATIVES**

The STI Facility is a major facility responsible for providing a broad range of ADP services to NASA Headquarters and, as assigned, on an agency-wide basis. The mission includes information resources management, development, and integration of automated systems, and use of agency-wide standard software and electronic communications. In analyzing the technical alternatives, the following alternatives were considered:

- Use of existing excess ADP resources available either within NASA, other government agencies, or contractors. Existing federal ADP resources have been screened and none can satisfy the requirement.
- Use of ADP equipment that is excess to the needs of other elements of NASA or other government agencies that is available or will become available by the planned installation date. The GSA automatic data processing resources availability list was screened and equipment that can meet the Facility's requirements is not available.

- Use of ADP resources made available through offloading of lower priority applications. Not applicable, as the requirement is for a Prototype System, which uses new technology.
- Use of Federal Data Processing Centers. The NASA STI Facility is a major facility responsible for providing a broad range of ADP services to NASA Headquarters and, as assigned, on an agency-wide basis. The mission includes information resources management development and integration of automated systems, and use of agency-wide standard software and electronic communications. Therefore, use of a Federal Data Processing Center is not a consideration, as the requirement is for a Prototype System which uses new technology.
- Use of non-ADP resources. The NASA STI Facility is a major facility responsible for providing a broad range of ADP services to NASA Headquarters and, as assigned, on an agency-wide basis. The mission includes information resources management, development and integration of automated systems, and use of agency-wide standard software and electronic communications. Not applicable, as the requirement is for a Prototype System which uses new technology.
- Revision of production schedule or job stream to improve throughput capability. Not applicable, as the requirement is for a Prototype System which uses new technology.
- Additional or change of working shifts to increase capacity. Not applicable, as the requirement is for a Prototype System which uses new technology.
- Acquisition of new, warranted as new, or used equipment to augment installed ADPE by adding additional components to increase data processing capacity, i.e., upgrading selected system components, such as adding additional selector channels, memory, faster tape, or disk units in order to improve throughput capability. Not applicable as this acquisition is for a Prototype System based on new technology. The Prototype System will run parallel to the existing system and perform functions not possible with existing systems.
- Acquisition of new, warranted as new, or used equipment to replace the installed ADP system with a compatible system that will handle the workload. Not applicable, as the requirement is for a Prototype System which uses new technology.
- Acquisition of new, warranted as new, or used equipment to competitively replace the installed ADP system through use of functional specifications. Not applicable, as the requirement is for a Prototype System which uses new technology.

### **3. COMPARATIVE COST ANALYSIS**

#### **3.1 Alternative System Configurations**

Several types of digital image management system configurations were considered during the evaluation stage of this project before the recommendation and decision was made to implement a PC-based distributed processing system. Two other approaches were evaluated,

one made use of a centralized processing system and the other made use of the existing mainframe computing complex.

The centralized processing system would use a control computer to monitor or perform all data processing tasks while peripherals have little or no processing power of their own. Stand-alone, turnkey workstation systems usually adopt this strategy. They consist of a scanner, printer and optical disk drive all to be controlled by a single PC. This approach is not recommended for the STI Facility because such configurations are good only for small office environments requiring minimal functionality and offer little room for expansion or modification. Furthermore, multitasking is not easy to implement, thereby reducing the potential for full, simultaneous use of individual peripherals.

NASA has not placed any functional requirements for communication by or to the mainframe in its most recent directives to the STI Facility regarding the DDS project. Although original NASA Headquarters Code NTT guidance required integration with the NASA/RECON online application currently running on a Facility mainframe, subsequent direction affected this requirement. This redirection involved a scaling down of mainframe-level integration and the elimination of full-text capture, search and retrieval at this time. Therefore, consideration was also given earlier to a configuration based on one of the STI Facility's existing IBM 4381 mainframes augmented with workstations and peripherals attached directly to the mainframe or to a LAN connected to the mainframe, using 3270-type emulation. This approach has the benefits of central access, security, application integrity through central control and a large, shared database. The mainframe, however, would be required to service the workstations in addition to its regular activities. It would also handle the communication processing power for the entire imaging application, which contain very large files. Peak workloads on the imaging system could severely degrade mainframe performance.

Although technically acceptable, this approach of using the existing mainframe computing complex is not recommended at this time. In its current configuration, the mainframe has been optimized for the rapid transmission of relatively small amounts of information—search requests and document abstracts. The mainframe is not set up to handle the enormous amount of data associated with document page images. Putting digital image communications traffic on the same mainframe as online databases is analogous to introducing a fleet of fully loaded, slow moving 18-wheel trucks on the German Autobahn with small, quick cars. The trucks (digital image data) would adversely impact the speed at which passenger traffic (user requests) could travel.

### **3.2 Alternative Acquisition Strategies**

Many factors were taken into consideration during the evaluation of alternative acquisition methods. A major issue is that this is a Prototype System, which is deemed expendable. Therefore, only a one-year system life is projected. Additionally, only the three PC base systems and the printer are available for acquisition through means other than purchase by NASA Headquarters. In as much as the system life is for one-year, lease is not a viable alternative, as lease terms are available for 24 and 36 month terms, and the remaining alternative, rental, results in a 12 month rental cost equal to the purchase cost. Based on the above factors, and taking into consideration the undesirable practice of mixing government-owned and leased components, the Prototype System will be purchased by NASA Headquarters.

Two acquisition strategies were analyzed: (1) unbundled purchase of components with system integration performed by Facility staff, and (2) purchase of an off-the-shelf vendor turnkey system. The recommended acquisition strategy for the DDS Prototype System is the competitive purchase of unbundled components by NASA Headquarters, with subsequent system integration to be supplied by STI Facility staff. Attachment 2 details the projected costs for this strategy. The estimated one-year system life cost for the STI Facility-integrated Prototype System is \$241,550. This system life cost includes purchase of hardware and software, optical disk media, training, labor, project management, administrative support, and maintenance for the Prototype System.

The other alternative system acquisition strategy evaluated for the prototype was based on turnkey system approach. Specific pricing and performance criteria were established to make the evaluation. Two turnkey systems, with similar architecture as the DDS, were evaluated. These "off-the-shelf" systems contain many similar components to the recommended DDS prototype configuration but have less functionality in some of the critical imaging features required by NASA. The vendors of these two turnkey systems are SMA and Amitech.

SMA, who is a systems integrator, remarkets a closed, turnkey system supplied by an established image management system vendor. The integrator's value-added capabilities include additional features and functionality, systems analysis, customization of the software or a compatible substitute, system installation and user training. The baseline pricing for the image management system comparable to the DDS Prototype System is approximately \$200,000. This system would need extensive modifications and customizing to achieve the functional and technical requirements for a prototype DDS at the STI Facility. These value-added items are not included in the baseline system price, but must be purchased from SMA by NASA at a cost of \$117 per hour. The STI Facility staff has estimated that 930 hours will be required by the vendor for set-up, installation, configuration, testing and software engineering. This equates to a cost of \$108,810. In addition, there are STI Facility

labor requirements for testing, training, and project management which are static under either of the acquisition alternatives. These costs are estimated at \$50,015. Therefore, the total estimated system life cost for the SMA turnkey alternative is \$358,825.

Amitech Corporation is a technical support and service company which markets a micro-computer-based turnkey system. Amitech's baseline pricing for a single workstation image processing system is \$31,990. This single workstation provides an office automation approach to document imaging and effectively supports an electronic file cabinet capability. In order to achieve the functional and technical requirements for the prototype DDS at the Facility, three of the base units would have to be purchased along with a LAN, LAN software, workflow and system management software, and multiple optical disk drives or a jukebox. It is estimated that the purchase of such equipment from Amitech would cost \$160,000. Additional labor from Amitech would have to be procured by NASA to customize the configuration and absorb the additional equipment required. It is estimated that 2,500 hours would be required. This labor procured from Amitech through the STIF contract at \$81 per hour equates to a cost of \$202,500. In addition, there are STI Facility labor requirements for testing, training, and project management which are static under either of the acquisition alternatives. These costs are estimated at \$50,015. Therefore, the total estimated system life cost for the Amitech turnkey alternative is \$412,515.

Attachment 3 compares the costs associated with each of the acquisition strategies. Due to the price structure and practical limitations of the turnkey procurement approach, NASA Headquarters will procure the components and software packages, and direct STI Facility staff to perform the integration of components and the customization at a substantially lower labor rate. This strategy allows the government to maximize on functionality and minimize acquisition and implementation costs.

#### **4. SYSTEM DESCRIPTION**

The Prototype System is based on the open-architecture approach discussed and recommended in the DDS Project's Digital Imaging Technology Assessment report delivered to NASA on August 7, 1989. The open-architecture approach will allow for flexibility and future modification. It also allows for a wide choice of various hardware and software components and uses standardized communication protocols. Access to internal components is usually provided so specialized circuitry can be added, and the software is usually well documented so changes can be made easily in the future.

The DDS open-architecture approach will center on the use of a distributed processing system which uses peripherals that contain their own processor and are relatively independent from a control computer. Since each peripheral can operate independently, multitasking is easier to implement, allowing simultaneous applications to take place.

In most cases, proven and standard technology is used in this Prototype System. This will permit a system evaluation using the prototype that will provide the basis for minimizing implementation risks while providing the majority of the functionality in the subsequent Pilot Production System.

The prototype image system will distribute functions among three multipurpose workstations connected to each other through a LAN. The three multipurpose workstations include: (1) Image Capture Workstation, (2) Quality Control/Image Enhancement Workstation and (3) Combination Reproduction/Document File Server/Image Retrieval Workstation. Detailed Technical specifications for each component as included in Attachment 5.

#### **4.1 Image Capture Workstation**

This is the primary workstation for the conversion of printed documents to digital images. Versatility in scanning modes, scanning speed and automatic correction and adjustment are required. The monitor and software will allow the operator to confirm the acceptability of the scanned images as well as the text application of logging in the documents when processed. Compression/decompression functions are required for passing images to the Quality Control/Image Enhancement Workstation. This workstation consists of the following components:

- PC 386/25 base unit with 8MB of RAM, minimum 150MB hard-disk drive with a maximum 18 millisecond access time and 80387 math coprocessor, minimum 25 MHz speed 3.5-inch diskette drive, 5.25-inch high-density diskette drive, two serial ports, one parallel port, minimum of eight PC board slots (with at least four at full length), enhanced 101 keyboard, cache memory and controller, mouse and MS-DOS 4.01 software
- 19-inch landscape imaging monitor with 1600 by 1200 pixel resolution, with two-page display and true aspect ratio
- Flatbed scanner with automatic document feeder and image processing board. Scanning must be in the 200 to 400 dpi resolution range, with true gray-scale capture ability at 64 levels; scanner must be accompanied by an image processing board that provides software image processing features for automatic text/graphic detection, antialiasing and dynamic threshold control
- Image display/printer interface board

- Serial hand-held scanner for multiple-font recognition required to scan database accession numbers on file folder label
- Surge protector/power organizer, workstation table and chair

See detailed Technical Specifications, included as Attachment 5, for additional information.

#### **4.2 Quality Control/Image Enhancement Workstation**

The Quality Control/Image Enhancement workstation is responsible for the quality verification, image enhancement and premastering capabilities for digital images onto the rewritable optical disk for subsequent batch storage onto the Write Once, Read Many optical disk. Workstation functions include retrieving, compressing, decompressing, displaying, manipulating and printing documents. An imaging processing platform provides system level integration when combined with application level image software and allows the user to carry out these functions. At this workstation digital images will be altered programmatically to improve legibility, and batched processing will allow precise control of LAN traffic to minimize collisions. A magneto-optical, rewritable drive will provide for temporary storage, verification and packaging of document pages before the commitment of data to production, and a convenient mechanism for providing generation backups. Modems and a PC fax board will support testing of remote image retrieval. This workstation consists of the following components:

- PC 386/25 base unit with 8MB RAM, minimum 150MB hard-disk drive with a maximum 18 millisecond access time and 80387 math coprocessor, minimum 25 MHz speed 3.5-inch diskette drive, 5.25-inch high-density diskette drive, two serial ports, one parallel port, minimum of eight PC board slots (with at least four at full length), enhanced 101 keyboard, mouse and MS-DOS 4.01 software
- High-resolution (1,600-by-1,200 pixels) 19-inch dual page, gray scale monitor
- OCR software for Table of Contents indexing
- Image compression/decompression board
- High-resolution scanner with true gray scale at 64 levels and 800 dpi selectable resolution
- 5.25-inch rewritable optical disk drive (this component will double as an expanded memory device and image buffer)
- Image enhancement software and image display software
- PC fax board
- Two 9,600-bps modems
- Surge protector/power organizer, workstation table and chair

See detailed Technical Specifications, included as Attachment 5, for additional information.



### 4.3 Combination Reproduction/Document File Server/Image Retrieval Workstation

The third workstation will perform multipurpose functions, such as image storage, image retrieval and output functions. In addition, this workstation will serve as the network file server and will therefore provide multiuser/multitasking capabilities and allow for sharing of resources and network communications. System management reports will be generated at this workstation, based on a log of system functions, and will be used for system analysis and capacity planning. This workstation consists of the following components:

- PC 386/25 base unit with 8MB RAM, minimum 300MB hard-disk drive with a maximum 18 millisecond access time, minimum 25 MHZ speed, cache memory and controller, 3.5-inch diskette drive, 5.25-inch high-density diskette drive, two serial ports, one parallel port, minimum of eight PC board slots (with at least four at full length), enhanced 101 keyboard, mouse and MS-DOS 4.01 software
- 15-inch portrait imaging monitor with 800 by 1000 pixel resolution
- 12-inch WORM image archive with controller
- Image display/printer interface board
- Image printer video adapter cable
- Laser printer rated at 8 ppm and 300 dpi, with dual tray with 200-sheet capacity per tray and capable of duplex (double-sided) printing
- CD-ROM drive with MS-DOS extensions
- Image file server software
- Surge protector/power organizer, workstation table and chair

See detailed Technical Specifications, included as Attachment 5, for additional information.

### 4.4 Local Area Network (LAN)

The LAN will be used to interconnect the three workstations and form the prototype imaging system. The LAN will be based on an Ethernet topology, which is a bus that uses carrier sense and collision detection. The LAN consists of the following:

- LAN boards and cabling for three stations
- LAN software
- Multistation access unit
- 3270 emulation board
- 3270 emulation software
- Remote image reception software
- Utility software
- Software integration tools, to include C compiler and Cscape screen/code generator
- Windows application package
- Document image database software

See detailed Technical Specifications, included as Attachment 5, for additional information.

## 5. FUNDING DATA

The estimated funding required to purchase the items contained in this plan is \$89,717. These costs are itemized in Attachment 4. The projected 4,360 direct labor hours required to perform the in-house system customization, implementation and assessment, are within current contract financial and level-of-effort (LOE) boundaries of the NASA STI Facility Contract. The application of hours to these efforts will be authorized through Task Assignment (TA).

The fixed and recurring costs for the items contained in this plan over the full life cycle are referenced in the STI Facility's Information Technology Systems Plan under the Unique Project Number (UPN) 328.

## 6. SCHEDULES

Order Received at STI Facility	Day 1
Complete Installation	Day 14
Complete Component Testing	Day 28
Complete Workstation Testing	Day 50
Complete Network Testing	Day 95
Complete System Testing	Day 135
System Acceptance/Prototype Operational	Day 160

## 7. ACQUISITION METHOD

The estimated contract value for the entire projected acquisition cost represented in this plan warrants issuance of a CBD synopsis. Initial survey and analysis indicates that a competitive purchase of unbundled components by NASA Headquarters with system integration supplied by STI Facility staff to be the most advantageous to the government. However, responses to the synopsis will be evaluated to determine the requirement and/or benefit for a formal solicitation.

## 8. SECURITY AND PRIVACY SAFEGUARDS

Equipment or services identified by this request will not be used to operate a system of records on individuals to accomplish an agency function, nor will this system be used to process proprietary mission-critical, or life critical data.

## 9. FUTURE COMPETITION

Competition for any subsequent acquisitions will not be limited based on this procurement. The DDS prototype equipment will be used to test and validate assumptions about skill levels required of operators for such a system and other critical planning assumptions, and to further specify a production-level system. The Prototype System is based on an open-architecture approach, the same approach planned for the proposed production-level system. This open architecture approach allows for a wide choice of various hardware and software components and uses standardized communication protocols. Additionally, the planned use and functionality of each of these two systems is sufficiently distinct so as to avoid the use of the prototype equipment as a prerequisite to compatibility with the production-level system. This Acquisition Plan is for a stand-alone procurement for the DDS prototype system only. The purpose of the Prototype System is to determine specifications for the phased implementation of a DDS Production System (Pilot Production System phase and Full-Scale System phase).

## 10. LONG-RANGE REQUIREMENTS

Based on current NASA direction, the DDS project requires two stages of implementation: 1) Prototype System, 2) Production System. The Production System is planned to be implemented in two phases: Pilot and Full-Scale. The Prototype System will be acquired as a result of this plan. The Prototype System will be used to validate current working assumptions, to test the performance of the system against the workload projected for the production-level system documented in the Impact Analysis report, and to further specify requirements for the production-level system. The two phases in the second stage will require a separate procurement which may be conducted in phases. The Prototype System will be procured by NASA Headquarters separately from the procurement of the second stage system. At the time of the second stage procurement, components of the Prototype System will be either cannibalized or surplusd at its termination. Stage two is comprised of the two remaining phases, as follows:

**Phase 1: Pilot Production System.** The purpose of the Pilot Production System is to validate the set of specifications derived during the DDS Prototype System one-year life cycle. The Pilot Production System is required to support the full functionality required for central operation by NASA STI Facility and for remote access by NASA Headquarters, Code NTT only. Input to the DDS Pilot Production System will be limited to 5,000 NASA Technical Reports annually with a centrally operated storage and hard-copy reproduction service at the STI Facility. Use of the DDS system for meeting specific hard-copy reproduction service requirements will be determined on a case-by-case basis by STI Facility staff. Functions that were carried out in the prototype by multipurpose workstations will be configured in the Pilot Production System to be

accomplished by special purpose dedicated workstations. The Pilot Production System will consist of five workstations, one of which will be remote.

**Phase 2: Full-Scale System Implementation.** No difference exists between the Pilot Production and the Full-Scale Systems in terms of input and functionality supported. The singular difference distinguishing these two system levels is the number of remote sites enabled for retrieval access. Although the Pilot Production System will provide remote access, it will be restricted to NASA Headquarters, Code NTT only. With the Full-Scale System, all 15 NASA Centers will access the DDS system. Access by non-NASA staff or non-NASA contractors is not planned for this system level. A report documenting the anticipated impacts to the STI Facility was delivered to NASA Headquarters on March 12, 1990. It contained a preliminary identification of the equipment needed to support the Full-Scale System implementation level. Additional optical storage devices and software to manage multiple storage devices will be required, along with an upgrade to the LAN supporting the digital imaging system, and a considerable upgrade to the STI Facility's communications processing capability.

## **11. ANNUAL INFORMATION TECHNOLOGY SYSTEMS PLAN CROSS-REFERENCE**

The items covered by this acquisition plan are referenced in the Facility's Annual Information Technology Systems Plan (ITSP). The appropriate cross references in the ITSP are:

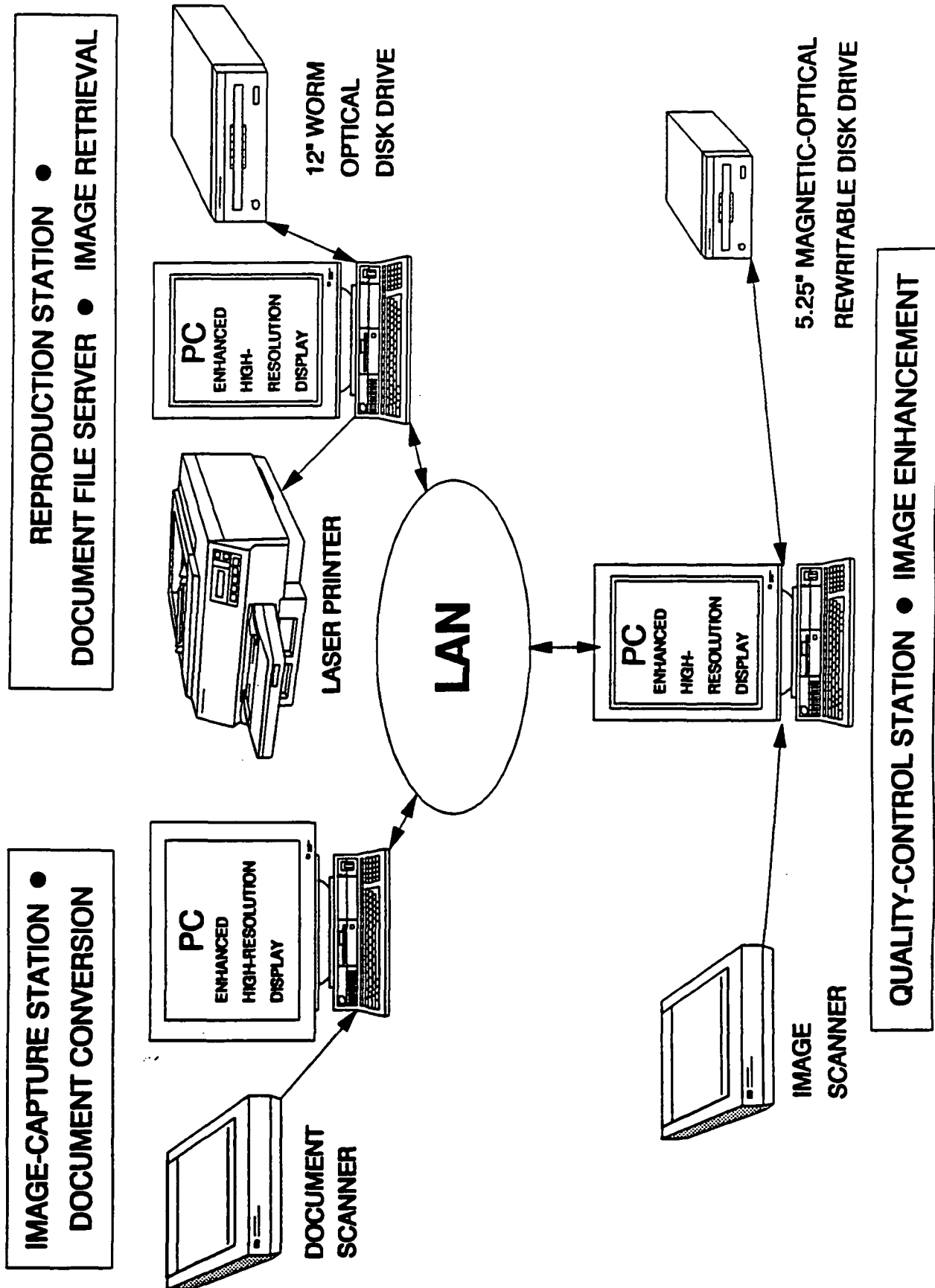
Center: NASA/STIF  
System ID: 1011-00  
System Name: Scientific & Tec. Info. Fac.  
Section 5.3.6

## **12. SOFTWARE CONVERSION STUDY**

A software conversion study is not required, per NHB 2410.1D, Section 402, paragraph 12.

## **13. FEDERAL INFORMATION PROCESSING STANDARDS (FIPS) WAIVERS**

The FIPS that apply to the items contained in this acquisition plan are: 32-1, Optical Character Recognition Character Sets; 107, Local Area Networks Baseband Carrier Sense Multiple Access with Collision Detection Access Method and Physical Layer Specifications and Link Layer Protocol; and 131 (pending), Standard for Small Computer System Interface (SCSI). These standards will be observed.



Attachment 1. Proposed DDS Prototype Configuration

**ATTACHMENT 2****ESTIMATED PROTOTYPE SYSTEM LIFE CYCLE COSTS**

NASW-4070 (STI Facility Operations Contract)			<u>Hours</u>	<u>Cost</u>
Burdened Direct Labor	4,360			\$140,983
Burdened ODCs				10,850
Total Equipment Cost				<u>89,717</u>
Total Cost				\$241,550

**NOTE: Burdened through G&A and fee.**

## ATTACHMENT 3

**COMPARATIVE COSTS FOR  
ALTERNATIVE ACQUISITION STRATEGIES**

	Unbundled Components/ System Integration at STI Facility	Customized SMA Turnkey System	Customized Amitech Turnkey System
Equipment	\$ 89,717	\$ 200,000	\$ 160,000
Labor-Services	90,968	108,810	202,500
-Labor Testing, Training, and Management	50,015	50,015	50,015
ODCs	10,850	-0-	-0-
<b>TOTAL</b>	<b>\$ 241,550</b>	<b>\$ 358,825</b>	<b>\$ 412,515</b>

NOTE: All Facility and all labor costs include burden through fee.



Attachment 4  
DDS Prototype System  
Estimated Cost Summary - Components List

Description	Estimated Unit Cost	Quantity	Total
PC 386/25 Base Unit with 8 MB RAM, 150 MB Hard Disk, Math Co- processor, MS DOS, Cache Memory	\$6,000.00	2	\$12,000.00
PC 386/25 Base Unit with 8 MB RAM, 300 MB Hard Disk, MS DOS, Cache Memory	6,500.00	1	\$6,500.00
Serial Mouse	\$98.00	3	\$294.00
Dual Page Monitor and Controller Board	\$1,832.64	1	\$1,832.64
Image Scanner	\$4,120.00	1	\$4,120.00
Image Processing Board	\$880.00	1	\$880.00
Image Display/Scanner Interface Board & Cable	\$2,075.00	1	\$2,075.00
Hand-held Scanner	\$190.00	1	\$190.00
Dual Page Gray Scale Monitor	\$2,493.72	1	\$2,493.72
Gray Scale Scanner with Software	\$3,995.00	1	\$3,995.00
Image Retrieval Interface Board	\$995.00	1	\$995.00
Rewritable Image Storage	\$5,495.00	1	\$5,495.00
Gray Scale Software	\$399.00	1	\$399.00

**Attachment 4**  
**DDS Prototype System**  
**Estimated Cost Summary – Components List**

<b>Description</b>	<b>Estimated Unit Cost</b>	<b>Quantity</b>	<b>Total</b>
OCR Software	\$583.00	1	\$583.00
PC Facsimile Board	\$519.00	1	\$519.00
Modem	\$925.00	1	\$925.00
Remote Access Software for Modem	\$125.00	1	\$125.00
Full Page Mono Monitor and Adapter	\$875.00	1	\$875.00
12" WORM Drive and Controller	\$22,500.00	1	\$22,500.00
Image Display/Printer Interface Board, Cable and Printer Video Adapter	\$2,120.00	1	\$2,120.00
CD-ROM Drive and Controller	\$675.00	1	\$675.00
WORM Driver and Host Adapter Card	\$495.00	1	\$495.00
Laser Printer with Memory Expansion	\$2,795.00	1	\$2,795.00
Local Area Network Operating System	\$4,550.00	1	\$4,550.00
LAN Compiler	\$799.00	1	\$799.00
LAN Interface Cards	\$749.00	4	\$2,996.00
Document Image Database Software	\$1,995.00	1	\$1,995.00
Multistation Access Unit	\$489.00	1	\$489.00

Attachment 4  
 DDS Prototype System  
 Estimated Cost Summary – Components List

Description	Estimated Unit Cost	Quantity	Total
NIC to MAU Cabeling	\$48.50	3	\$145.50
3270 Emulation Board	\$382.00	1	\$382.00
3270 Emulation Board Software	\$285.00	1	\$285.00
KIPP Developers Tool Kit	\$995.00	1	\$995.00
Remote Image Software	\$99.00	1	\$99.00
DOS Multitasking OS with Mouse Driven Graphical Interface	\$125.00	2	\$250.00
Windows Application Package	\$759.00	1	\$759.00
Power Organizer/ Surge Protector	\$99.00	3	\$297.00
Computer Desk & Table	\$272.00	3	\$816.00
Laser Printer Table and Scanner Table	\$149.00	3	\$447.00
Chairs	\$189.00	3	\$567.00
Chair Arm Kit	\$49.95	1	\$49.95
Windows 3.0 Software Development Kit	\$319.00	1	\$319.00
LAN Management Software	\$595.00	1	\$595.00
			<b>\$89,716.81</b>

**ATTACHMENT 5**

**DDS PROTOTYPE SYSTEM  
TECHNICAL SPECIFICATIONS FOR COMPONENTS**

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** A - Image Capture Station  
**COMPONENT:** Personal Computer Base Unit  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must be an IBM compatible personal computer configured as follows:  
Must include Intel 80386 microprocessor running at a minimum of 25 MHZ  
Must have minimum of 8 MB of 32-bit RAM  
Must have Page-mode interleaved memory  
Must have minimum of 150 MB internal hard disk with a maximum average access time of 18 ms  
Must include a dual diskette & compatible hard drive controller  
Must have Intel 82385 Cache Memory Controller  
Must have a minimum of 32 KB 25 ns RAM cache memory  
Must have 3.5 " 1.44 MB diskette drive  
Must have 5.25" 1.2 MB diskette drive  
Must have room for additional panel accessed drive  
Must have a minimum of 200 watt power supply  
Must have a minimum of 25 MHZ 80387 Math Co-processor  
Must have a minimum of 2 serial Ports & 1 Parallel Port  
Must have a minimum of 8 PC Board Slots (6 available)  
Must have an enhanced 101 Keyboard  
Must include MS-DOS 4.01 Software or most recent version  
Must support Netware 386/3.0 or most recent version  
Must support Microsoft Windows 3.0 (minimum) or most recent version

**SUGGESTED/LIST PRICE:** \$6000.00

**RECOMMENDED MAKE/MODEL:** Dell System 325

**Comments:** Good price/performance and excellent on-site repair service. Special pricing usually in effect on a selected package.

**Rep/Distributor:** Dell Computer Corporation

**Contact:** Telephone: 800 426-5150

**Price:** \$6000.00

**ALTERNATIVE MAKE/MODEL:** Any 30386/25 PC that is compatible with Kofax imaging boards and meets or exceeds all above specifications.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** A - Image Capture Station  
**COMPONENT:** Dual Page Monitor and Controller Board  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

- Must be minimum 19" diagonal screen
- Must have a minimum of 1600 X 1200 pixel resolution
- Must not require a separate adapter for DOS modes
- Must be non-interlaced 60 HZ vertical scanning frequency
- Must operate in 16-bit mode
- Must have an 8-and a 16-bit video BIOS and RAM support
- Must have Hercules support
- Must support a Microsoft Windows 3.0 or later driver

**SUGGESTED/LIST PRICE:** \$2495.00

**RECOMMENDED MAKE/MODEL:** Cornerstone 1600B-1-19 PC MONO

**Comments:** Monitor includes adapter, cable documentation and software.

**Rep/Distributor:** Micro Marketing International

**Contact:** Telephone: 301 948-8256

**Price:** \$1832.64

**ALTERNATIVE MAKE/MODEL:** Sigma/L-View PC

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** A - Image Capture Station

**COMPONENT:** Image Scanner

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must be 200, 240, 300, and 400 dpi selectable

Must be able to run at a minimum of 25 ppm (at 200 dpi)

Must have an automatic document feeder with 50 to 100 sheet capacity

Must include a flatbed A4 size platform for book scanning

Must have 64-gray scale steps in half-tone mode

Must have binary video and dithered video output

**SUGGESTED/LIST PRICE:** \$5600.00

**RECOMMENDED MAKE/MODEL:** Fijitsu M3093-F

**Comments:** Purchase with Image Processing Board. Kofax image boards are made to work with this scanner. Kofax cable SC-1010 provides interface to PC from the scanner. Includes one cable SC-1010.

**Rep/Distributor:** Schweber Electronics

**Contact:** Patty McCarthy **Telephone:** 301 596-7800

**Price:** \$4120.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** A - Image Capture Workstation

**COMPONENT:** Image Processing Board

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must have extended image features for M3093-F scanner

Must be Anti-aliasing

Must be Auto-discrimination

Must have dynamic thresholding

Must have Zooming capabilities of 25% to 400% in 1% increments

Must include mirror function, overlays and outlining

**SUGGESTED/LIST PRICE:** \$925.00

**RECOMMENDED MAKE/MODEL:** Fijitsu B01L-4440-0101

**Comments:** Works exclusively with M3093-F scanner.

**Rep/Distributor** Schweber electronics

**Contact:** Pattie McCarthy **Telephone:** 301 596-7800

**Price:** \$880.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.



**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** A - Image Capture Station

**COMPONENT:** Image Display/Scanner Interface Board  
and Cable

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**  
Must control scanner input  
Must provide hardware based compression and decompression  
Must allow concurrent image processing with I/O activity  
Must be non-dedicated memory design  
Must have image scaling and image rotation

**SUGGESTED/LIST PRICE:** \$1995.00, cable \$80.00

**RECOMMENDED MAKE/MODEL:** Kofax KF-9200-1000

**Comments:** Part of KIPP, Kofax Image Processing Platform. Volume and package discounts may apply. Suggested/List price listed above does not reflect KIPP bundled price. KIPP system based upon availability of suitable image software and Microsoft Windows 3.0. Include one cable SC-1010 with purchase.

**Rep/Distributor:** Kofax Image Products, Inc.

**Contact:** Ken Braun **Telephone:** 714 727-1733

**Price:** \$2075.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** A - Image Capture Station**COMPONENT:** Hand Held Scanner**QUANTITY REQUIRED:** 1**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must have a minimum of 100 to 400 dpi resolution  
Must run at a minimum of 7.5 seconds at 300 dpi  
Must have image capture formats TIFF, PCX, IMG  
Must have a minimum of 32 levels of dithered gray  
Must include Microsoft Windows driver  
Must have RS-232 serial connection

**SUGGESTED/LIST PRICE:** \$339.00**RECOMMENDED MAKE/MODEL:** Logitech Inc. Scanman Plus

**Comments:** Only hand held scanner with windows interface.

**Rep/Distributor:** Variety of vendors.

**Contact:** Telephone: 415 795-8500

**Price:** \$190.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** A - Image Capture Station**COMPONENT:** Serial Mouse**QUANTITY REQUIRED:** 1**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must have a minimum of 400 dpi base resolution

Must have a mechanical operation

Must have a minimum 5 foot cord

Must have a minimum of two buttons

Must be Microsoft Mouse compatible

Must have RS-232 serial connection

**SUGGESTED/LIST PRICE:** \$150.00**RECOMMENDED MAKE/MODEL:** Microsoft Series 400**Comments:** The unit with which all others claim compatibility.**Rep/Distributor:** Variety of vendors.**Contact:** **Telephone:****Price:** \$98.00**ALTERNATIVE MAKE/MODEL:** Any unit that is 100% compatible

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** C - Reproduction/Document File  
Server/Image Retrieval Station

**COMPONENT:** Personal Computer Base Unit

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must be an IBM compatible personal computer configured as follows:

Must include an Intel 80386 microprocessor running at a minimum of 25 MHZ

Must have a minimum of 8 MB of 32-bit RAM on the motherboard

Must have Page-mode interleaved memory

Must have a minimum of 300 MB internal hard disk with a maximum average access time of 18 ms

Must include a dual diskette & compatible hard drive controller

Must have Intel 82385 Cache Memory Controller

Must have a minimum of 32 KB 25 ns RAM cache memory

Must have a 3.5 " 1.44 MB diskette drive

Must have a 5.25" 1.2 MB diskette drive

Must have room for additional panel accessed drive

Must have a minimum 200 watt power supply

Must have a minimum of 2 serial Ports & 1 Parallel Port

Must have a minimum of 8 PC Board Slots (6 available)

Must have an enhanced 101 Keyboard

Must include MS-DOS 4.01 Software or most recent version

Must support Netware 386/3.0 or most recent version

Must support Microsoft Windows 3.0 (minimum) or most recent version

**SUGGESTED/LIST PRICE:** \$6500.00

**RECOMMENDED MAKE/MODEL:** Dell System 325

**Comments:** Good price/performance and excellent on-site repair service. Special pricing usually in effect on a selected package.

**Rep/Distributor:** Dell Computer Corporation

**Contact:** Telephone: 800 426-5150

**Price:** \$6500.00

**ALTERNATIVE MAKE/MODEL:** Any 30386/25 PC that is compatible with Kofax imaging boards and meets or exceeds all above specifications.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** C - Reproduction/Document File  
Server/Image Retrieval Station

**COMPONENT:** Full Page Mono Monitor and Adapter

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

- Must be minimum 15" diagonal portrait orientation screen
- Must have a minimum of 800 X 1000 pixel resolution
- Must have a single adapter for multiple modes
- Must include multi-scanning capability from a minimum of 15.75  
KHZ to 60 KHZ
- Must have hardware register compatibility and support
- Must support Hercules, MDA, CGA, EGA, VGA
- Must come with drivers for full page extended VGA
- Must support Microsoft Window Driver

**SUGGESTED/LIST PRICE:** \$1050.00

**RECOMMENDED MAKE/MODEL:** Princeton Publishing Labs MultiView 15"

**Comments:** Price includes required GraPhix Pro  
adapter.

**Rep/Distributor:** Publishing Perfection

**Contact:** Telephone: 414 255-7600

**Price:** \$875.00

**ALTERNATIVE MAKE/MODEL:** Sigma/L-View PC

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** C - Reproduction/Document File  
Server/Image Retrieval Station

**COMPONENT:** 12" WORM Drive and Controller

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must use 30 cm (12") 2-sided disk, 1024 bytes to a sector

Must have formatted capacity of at least 5.0 Gbytes per disk

Must include media with projected life of more than 40 years

Must have data transfer rate of at least 600 Kb/sec (read)

Must have data transfer rate of at least 300 Kb/sec (write)

Must include external unit with dedicated power supply

Must be able to, at a minimum, load or unload a disk in 1.2 seconds

Must have a minimum 8,000 hours MTBF

Controller must have SCSI interface, provide error correction, provide logical addressing, and include two buffers of at least 64 Kb each

**ESTIMATED PRICE:** \$26495.00

**RECOMMENDED MAKE/MODEL:** Sony drive WDD-600  
Sony controller WDC-610  
Sony Interface cable RCC-015H  
Sony media WDM-6DLO

**Comments:** Purchase requires obtaining appropriate Netware/386 LAN drivers.

**Rep/Distributor:** Sony Corporation of America

**Contact:** Jim Ng **Telephone:** 201 930-6790

**Price:** \$22500.00

**ALTERNATIVE MAKE/MODEL:** Toshiba WM-S500A, WM-M500

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** C - Reproduction/Document File  
Server/Image Retrieval Station

**COMPONENT:** Image Display/Printer Interface Board,  
Cable and Printer Video Adapter

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**  
Must provide hardware compression and decompression  
Must allow concurrent image processing with I/O activity  
Must have designed with non-dedicated memory

**ESTIMATED PRICE:** \$1995.00, cable \$50.00, video adapter  
\$75.00

**RECOMMENDED MAKE/MODEL:** Kofax KF-9200-1000

**Comments:** Controls printer output through A  
Windows Kofax GDI driver. Part of KIPP,  
Kofax Image Processing Platform. Volume  
and package discounts may apply.  
Suggested/List price listed above does  
not reflect KIPP bundled price. KIPP  
system based upon availability of  
suitable image software and Microsoft  
Windows 3.0. Include one printer cable  
PC-1017 and required video adapter VA-  
1108-1000.

**Rep/Distributor:** Kofax Image Products, Inc.

**Contact:** Ken Braun **Telephone:** 714 727-1733

**Price:** \$2120.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** C - Reproduction/Document File  
Server/Image Retrieval Station

**COMPONENT:** Serial Mouse

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

- Must have a minimum of 400 dpi base resolution
- Must have a mechanical operation
- Must have at least 5 foot cord
- Must have at least two buttons
- Must be Microsoft Windows compatible
- Must have RS-232 serial connection

**SUGGESTED/LIST PRICE:** \$150.00

**RECOMMENDED MAKE/MODEL:** Microsoft Series 400

**Comments:** The unit with which all others claim  
compatibility.

**Rep/Distributor:** Variety of vendors.

**Contact:** **Telephone:**

**Price:** \$98.00

**ALTERNATIVE MAKE/MODEL:** Any unit that is 100% compatible.



**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** C - Reproduction/Document File  
Server/Image Retrieval Station

**COMPONENT:** CD-ROM Drive and Controller

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

- Must include SCSI interface
- Must be external, standalone, front loading unit
- Must be able to fit between monitor and CPU
- Does not require CD-ROM caddy
- Must be able to play a 3" and 5 1/4" disk without an adapter
- Must include storage capacity: Mode 1 of 599 MB and Mode 2 of 638 MB
- Must have a data transfer rate at a minimum of 153 KB mode 1, and a minimum of 175 KB mode 2
- Should have a MTBF at minimum of 10000 hours
- Must have average access time of less than 400 ms
- Must have a minimum of 16 K data buffer
- Must have full digital-audio capability

**SUGGESTED/LIST PRICE:** \$870.00

**RECOMMENDED MAKE/MODEL:** Toshiba XM-5100A

**Comments:** Comes as a plug and play kit including:  
Host bus adapter, Interface cable, MS-DOS extensions, manual, instructions and sample disk.

**Rep/Distributor:** CAL-ABCO

**Contact:** Ken Doran **Telephone:** 301 474-0794

**Price:** \$675.00

**ALTERNATIVE MAKE/MODEL:** NEC Intersect CDR-72

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** C - Reproduction/Document File  
Server/Image Retrieval Station

**COMPONENT:** WORM Driver and Host Adapter Card

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must provide software interface between image software and  
selected WORM Drive

Must include host (PC base unit) SCSI Adapter card

Must allow entire WORM disk to be formatted as one volume, one  
partition

Must provide magnetic emulation of an optical drive

Must not modify or 'patch' DOS

Software must not cluster sectors

**SUGGESTED/LIST PRICE:** \$495.00

**RECOMMENDED MAKE/MODEL:** Optisys OptiDriver WORM

**Comments:** Works with most optical drives, SCSI  
adapters. PC and MCA models are  
available.

**Rep/Distributor:** Optisys Inc.

**Contact:** Tom Dibase **Telephone:** 800 327-1271

**Price:** \$495.00

**ALTERNATIVE MAKE/MODEL:** OSS Wormware

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** C - Reproduction/Document File  
Server/Image Retrieval Station

**COMPONENT:** Laser Printer With Memory Expansion

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

- Must have a minimum of 8 ppm print speed
- Must include a desktop unit
- Must have dual tray (200 sheets per tray)
- Must be able to print two sided (duplex)
- Must have a minimum of 300 X 300 dpi resolution
- Must have text and graphic printing capability
- Must have built-in, cartridge and disk-based(soft) fonts
- Must have Centronics, RS232 and RS422 interfaces
- Must include interface for Kofax direct video feature
- Must have a minimum of 2 MB memory expansion for faster print speeds and expanded font capacity

**SUGGESTED/LIST PRICE:** \$3495.00

**RECOMMENDED MAKE/MODEL:** HP Laser Jet IID

**Comments:** Comes withs eps toner and S2 font cartridge. Order with a minimum 2 MB upgrade.

**Rep/Distributor:** Government Marketing Services

**Contact:** Telephone: 703 478-6900

**Price:** \$2795.00 (includes a 2 MB upgrade)

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** B - Quality Control Station**COMPONENT:** Personal Computer Base Unit**QUANTITY REQUIRED:** 1**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must be an IBM compatible personal computer configured as follows:

Must include Intel 80386 microprocessor running at a minimum of 25 MHZ

Must have a minimum of 8 MB of 32-bit RAM

Must have Page-mode interleaved memory

Must have a minimum of 150 MB internal hard disk with a maximum average access time of 18 ms

Must include a dual diskette & compatible hard drive controller

Must have Intel 82385 Cache Memory Controller

Must have a minimum of 32 KB 25 ns RAM cache memory

Must have 3.5 " 1.44 MB diskette drive

Must have 5.25" 1.2 MB diskette drive

Must have room for additional panel accessed drive

Must have a minimum of 200 watt power supply

Must have a minimum of 25 MHZ 80387 Math Co-processor

Must have a minimum of 2 serial Ports & 1 Parallel Port

Must have a minimum of 8 PC Board Slots (6 available)

Must have an enhanced 101 Keyboard

Must include MS-DOS 4.01 Software or most recent version

Must support Netware 386/3.0 or most recent version

Must support Microsoft Windows 3.0 (minimum) or most recent version

**SUGGESTED/LIST PRICE:** \$6000.00**RECOMMENDED MAKE/MODEL:** Dell System 325

**Comments:** Good price/performance and excellent on-site repair service. Special pricing usually in effect on a selected package.

**Rep/Distributor:** Dell Computer Corporation**Contact:** Telephone: 800 426-5150**Price:** \$6000.00

**ALTERNATIVE MAKE/MODEL:** Any 30386/25 PC that is compatible with Kofax imaging boards and meets or exceeds all above specifications.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** B - Quality Control Station  
**COMPONENT:** Dual Page Gray Scale Monitor  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must be minimum 19" diagonal screen  
Must have a minimum of 16 levels true gray scale  
Must have a minimum of 1600 X 1200 pixel resolution  
Must not require a separate adapter for DOS  
Must be non-interlaced 60 HZ vertical scanning frequency  
Must operate in 16-bit mode  
Must have an 8-and a 16-bit video BIOS and RAM support  
Must have Hercules support  
Must support a Microsoft Window Driver

**SUGGESTED/LIST PRICE:** \$3495.00

**RECOMMENDED MAKE/MODEL:** Cornerstone 1600B-4-19 PC 16GS

**Comments:** Monitor includes adapter, cable documentation and software.

**Rep/Distributor:** Micro Marketing International

**Contact:** Telephone: 301 948-8256

**Price:** \$2493.72

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** B - Quality Control Station  
**COMPONENT:** Gray Scale Scanner with software  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Minimum selectable resolution of 100 dpi to 800 dpi  
Must have at least 150 to 200 lpi halftone resolution  
Must include a flatbed A4 size platform for book scanning  
Must have a scanning speed of at least 62 sec at 800 dpi for 8.5" X 11" document  
Must output a 6-bit, 64-gray scale continuous tone image  
Must include the following file formats: TIFF, PICT, Paint and EPS  
Must have minimum image scaling from 28.5% to 228.5%  
Must include the following selectable prescan options: image filtration, contrast equalization  
Must be able to descreen and rescreen images to eliminate moiré patterns

**SUGGESTED/LIST PRICE:** \$4350.00

**RECOMMENDED MAKE/MODEL:** Agfa Focus S800GS scanner

**Comments:** Do not confuse with Focus II model.

**Rep/Distributor:** Contact Manufacturer

**Contact:** Sue Riggs **Telephone:** 508 658-5600

**Price:** \$3995.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** B - Quality Control Station  
**COMPONENT:** Image Retrieval Interface Board  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must provide compression and decompression  
Must allow concurrent image processing with I/O activity  
Must have non-dedicated memory design  
Must include image scaling and image rotation

**SUGGESTED/LIST PRICE:** \$995.00

**RECOMMENDED MAKE/MODEL:** Kofax KF-9100-1000

**Comments:**

Part of KIPP, Kofax Image Processing Platform. Volume and package discounts may apply. Suggested/List Price listed above does not reflect KIPP bundled price. KIPP system based upon availability of suitable image software and Microsoft Windows 3.0.

**Rep/Distributor:** Kofax Image Products, Inc.

**Contact:** Ken Braun **Telephone:** 714 727-1733

**Price:** \$995.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** B - Quality Control Station

**COMPONENT:** Rewritable Image Storage

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must use 130 mm double sided Magneto-optical media

Must have a formatted capacity of 326 MB per side using a 1024 sector size

Media life should exceed 10 years

Must have average access speed less than 65 ms

Must have at least a 1.2 MB transfer rate

Must include SCSI interface

Must include MTBF 20,000 hours

Must include external case and dedicated power supply

Must be able to run major software compatible with DOS

Must support Novell Netware 386

**SUGGESTED/LIST PRICE:** \$5495.00

**RECOMMENDED MAKE/MODEL:** AGA DR650

**Comments:** Comes with AGADrive 16-bit SCSI controller, one magneto-optical media, AGA software & utilities for rewritable, documentation, and cables.

**Rep/Distributor:** Contact Manufacturer

**Contact:** Carlos Guio **Telephone:** 212 337-4200

**Price:** \$5495.00

**ALTERNATIVE MAKE/MODEL:** Storage Dimensions LANstor Erasable Optical



**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** B - Quality Control Station**COMPONENT:** Serial Mouse**QUANTITY REQUIRED:** 1**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must have a minimum of 400 dpi base resolution

Must have a mechanical operation

Must have at least a 5 foot cord

Must have at least two buttons

Must support Microsoft mouse interface

Must have RS 232 serial connection

**SUGGESTED/LIST PRICE:** \$150.00**RECOMMENDED MAKE/MODEL:** Microsoft Series 400**Comments:** The unit with which all others claim compatibility.**Rep/Distributor:** Variety of vendors.**Contact:** **Telephone:****Price:** \$98.00**ALTERNATIVE MAKE/MODEL:** Any unit that is 100% compatible.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** B - Quality Control Station

**COMPONENT:** Gray Scale Software

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

- Must include a Gray scale image editor
- Must be able to change image gray scale tones
- Must include capability for image smoothing enhancements
- Must be able to accept gray scale TIFF images
- Must provide scanner and printer calibration
- Must be Microsoft Windows compatible

**SUGGESTED/LIST PRICE:** \$595.00

**RECOMMENDED MAKE/MODEL:** Astral Picture Publisher

**Comments:** Works in conjunction with gray scale scanner.

**Rep/Distributor:** Creative Software and Systems

**Contact:** Telephone: 800 937-2387

**Price:** \$399.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** B - Quality Control Station**COMPONENT:** OCR Software**QUANTITY REQUIRED:** 1**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must have Page Recognition software  
Must read all non-stylized fonts from 6 to 72 points  
Must read typeset, proportionally spaced and kerned characters  
Must scan documents in both portrait and landscape orientation  
Must differentiate columns, graphics and text automatically  
Must allow for full or partial page selection  
Must be able to search, replace and insert in text mode  
Must be able to cut, copy and paste in graphic and text mode  
Must be able to zoom in and zoom out in 8 steps or more  
Must have an average of 40 cps recognition rate  
Graphics output must include TIFF format  
Must be Microsoft Windows compatible

**SUGGESTED/LIST PRICE:** \$895.00**RECOMMENDED MAKE/MODEL:** Caere Corporation Omnipage Model 103

**Comments:** Purchase with OmniSpell, a built-in spelling checker. Requires 4 MB of RAM, mouse, 300 dpi scanner with adapter.

**Rep/Distributor:** Government Marketing Services**Contact:** Telephone: 703 742-6900**Price:** \$583.00**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** B - Quality Control Station

**COMPONENT:** PC Facsimile Board

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must have at least 9600 baud fax and 2400 baud data  
Must support background transmission, scheduling, auto-send,  
transaction log, polling, and phone book  
Must support DCA/Intel CAS specifications (ICAS 1.0)  
Must be able to send faxes directly from within Windows  
applications  
Must support L/I/M EMS 3.2 or higher  
Must be compatible with PCX

**SUGGESTED/LIST PRICE:** \$695.00

**RECOMMENDED MAKE/MODEL:** Intel Connection Coprocessor PCCB6000

**Comments:** Includes software for sending files  
within Wordperfect and Lotus 1-2-3 with  
no conversions.

**Rep/Distributor:** Variety of vendors.

**Contact:** **Telephone:**

**Price:** \$519.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** B - Quality Control Station**COMPONENT:** Modem**QUANTITY REQUIRED:** 1**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must support full duplex 9600 baud  
Must be Bell and CCITT V.32 compliant  
Must include MNP levels 1-5 compression and error control  
Must be able to operate synchronously and asynchronously  
Must be Hayes AT command compatible  
Must be an external unit

**ESTIMATED PRICE:** \$1495.00**RECOMMENDED MAKE/MODEL:** U.S. Robotics Courier V32

**Comments:** Used for manufactures support and image  
test transmissions.

**Rep/Distributor:** Variety of vendors.

**Contact:** **Telephone:**

**Price:** \$925.00

**ALTERNATIVE MAKE/MODEL:** Hayes V-Series 9600 external

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** B - Quality Control Station

**COMPONENT:** Remote Access Software for Modem

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must support Crosstalk, Dart, Xmodem, Ymodem, Zmodem, Kermit, and Compuserve B file transfer protocols

Must include phone directory with automated dialing capacity

Must include script programming language

Must support Windows (cut and paste) with a mouse

Must support DDE directly with other programs

Must be able to emulate VT102, VT52, IBM 3101, Ansi color and Compuserve Vidtex

Must support a scroll buffer to 64K

Must have user programmable function keys

Must include true background operation under windows for file transfers

Must support Hayes V-series, US Robotics HST, Telebit Trailblazer and similar modems

**SUGGESTED/LIST PRICE:** \$195.00

**RECOMMENDED MAKE/MODEL:** Crosstalk for Windows

**Comments:** Requires run-time version (instead of developers version) of Windows. Shop for best price.

**Rep/Distributor:** Elek-Tek

**Contact:** Telephone: 800 395-1000 ext 5230

**Price:** \$125.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - Local Area Network and Software  
**COMPONENT:** LAN Operating System  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

- Must be a 32-bit operating system for 80386 architecture
- Must support CD-ROM and WORM drives at the server
- Must support multi-tasking
- Must allow dynamic resource configuration
- Must allow file sizes up to 4 GB
- Must allow up to 32 volumes per server
- Must allow up to 2 million directory entries per volume
- Must support Netware SPX and IPX protocols
- Must address up to 32 TB (Tetra Bytes)
- Must support DOS 4.01 Workstations

**SUGGESTED/LIST PRICE:** \$7995.00

**RECOMMENDED MAKE/MODEL:** Novell 386 Version 3.1, or most recent version.

**Comments:** May require extra-cost options that are now currently packaged with the product. Requires at least 2 MB of RAM to execute.

**Rep/Distributor:** PC Brand Inc.

**Contact:** Telephone: 800 722-7263

**Price:** \$4550.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** Local Area Network Compiler  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must include an integrated set of Netware 386 3.1 programming tools that generates 32-bit native mode 386 code  
Must include 32-bit ANSI C compiler, debugger, linker and library of Netware programming interfaces including Btrieve

**ESTIMATED PRICE:** \$995.00

**RECOMMENDED MAKE/MODEL:** Novell/ C Network Compiler/386

**Comments:** Allows developing distributed applications for both the server and the clients. These server applications are known as NLM's. This is a special compiler that includes functions to support Network communications.

**Rep/Distributor** Programmer's Paradise

**Contact:** Amelia Robinson **Telephone:** 201 389-9228

**Price:** \$799.00

**ALTERNATIVE MAKE/MODEL:** None has been identified



**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** D - LAN and software**COMPONENT:** LAN Interface Cards**QUANTITY REQUIRED:** 4**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must support Novell Netware 386 3.1 or later  
Must support token ring (IEEE 802.5X 88/55) at 4 and 16 Mbs  
Must support busmaster DMA data transfer  
Must be a 16-bit bus  
Must support minimum of up to 4 KB packets  
Must support LLC, IPX and SPX protocols  
Must include a NLN driver for Netware 386 server  
Must have a minimum of 128 KB RAM on the card

**SUGGESTED/LIST PRICE:** \$995.00 each/\$3980.00 total**RECOMMENDED MAKE/MODEL:** Madge Networks Inc/Smart 16/4 AT  
Ringnode token ring adapter.

**Comments:** Requires shield twisted pair wiring.  
Purchase with Madge Smart Server  
software.

**Rep/Distributor:** Contact Manufacturer**Contact:** Telephone: 408 441-1335**Price:** \$749.00 each (sale price)/\$2996.00 total**ALTERNATIVE MAKE/MODEL:** Gateway Communications/G Token Ring

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** Document Image Database Software  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must support Novell Netware 386 3.1 or most recent version  
Must support Windows 3.0 or later version with mouse  
Must support Kofax 9000 series image boards  
Must support scanning, viewing, indexing, ocring, filing, storage, printing, and retrieval of images  
Must allow image enhancement before storing to optical media  
Must allow hierarchial storage: pages within a document; documents within a set; and groups of documents

**SUGGESTED/LIST PRICE:** \$1995.00

**RECOMMENDED MAKE/MODEL:** ImageTech Marvinet 3.0

**Comments:** Allow price to include upgrades to meet specifications when appropriate version becomes available.

**Rep/Distributor:** ImageTech

**Contact:** John Karajozian **Telephone:** 800 451-7566/313 362 4141

**Price:** \$1995.00

**ALTERNATIVE MAKE/MODEL:** IDS/Filequest, Optika/Filepower or other imaging software that is a network-based system utilizing the KIPP boards.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** Multistation Access Unit  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must meet IEEE 802.5X 88/55 standard  
Must be compatible with IBM 8218, 8219, 8220 devices  
Must support 16 Mbps data rate  
Must have a minimum of 4 ports as well as a RI and RO  
Must have connections compatible with IBM connector #8310574

**SUGGESTED/LIST PRICE:** \$695.00

**RECOMMENDED MAKE/MODEL:** General Technology/Smart Multiple Access Unit

**Comments:** Shop for value

**Rep/Distributor:** Contact Manufacturer

**Contact:** Telephone: 407 242-2733

**Price:** \$489.00 (sale price)

**ALTERNATIVE MAKE/MODEL:** Star-tek 828AT-6 Intelligent MAU

**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** D - LAN and Software**COMPONENT:** NIC to MAU Cables**QUANTITY REQUIRED:** 3**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must be IBM type 1 adapter cables

Must be mechanically and electrically equivalent with IBM  
#6339098

Must be a minimum of 30 feet long

**SUGGESTED/LIST PRICE:** \$50.00 each/\$150.00 total**RECOMMENDED MAKE/MODEL:** Black Box/TJ-EVNTRD9-0030**Comments:**

Each NIC (Network interface Card) uses a cable to plug into the MAU. These two shielded twisted pair wires in one cable and the MAU constitute the physical token ring.

**Rep/Distributor:** Black Box Corporation**Contact:** **Telephone:** 412 746-5530**Price:** \$48.50 each/\$145.50 total**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software

**COMPONENT:** 3270 Emulation Board

**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must provide local terminal emulation

Must support IBM PC AT type bus

Must emulate 3278 and 3279 terminals

Should provide direct coaxial connection

Must support CUT and DFT mode

Must support background IND\$FILE file transfers

**SUGGESTED/LIST PRICE:** \$570.00

**RECOMMENDED MAKE/MODEL:** Attachmate 320 Coax Board P7100A

**Comments:** Purchase with Extra! for Windows

**Rep/Distributor:** Attachmate Corp.

**Contact:** Telephone: 703 684-4477

**Price:** \$382.00 GSA

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** 3270 Emulation Board Software  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

- Must provide local terminal emulation
- Must support Windows 3.0 or later version and mouse
- Must emulate 3278 and 3279 terminals
- Must support IBM Token Ring Coupler
- Must be compatible with IBM HLLAPI
- Must support CUT and DFT mode
- Must provide background IND\$FILE file transfers

**SUGGESTED/LIST PRICE:** \$425.00

**RECOMMENDED MAKE/MODEL:** Attachmate Extra! for Windows

**Comments:** Purchase with 3270 Coax Board

**Rep/Distributor:** Attachmate Corp.

**Contact:** Telephone: 703 684-4477

**Price:** \$285.00 GSA

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** KIPP Developers Tool kit  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Contains image libraries for system level programming of a KIPP based system

Libraries allow multiple image formats, Windows interface, image headers and concurrent task management

Contains Quickprint, a Windows based printer driver

Contains an application support kit for producing demos and image applications

**ESTIMATED PRICE:** \$995.00

**RECOMMENDED MAKE/MODEL:** Kofax/TK-9200

**Comments:** Starter kits that include a TK-9200 qualify for a 10% discount

**Rep/Distributor** Kofax Image Products

**Contact:** Ken Braun **Telephone:** 714 727-1733

**Price:** \$995.00

**ALTERNATIVE MAKE/MODEL:** None has been identified

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** Remote Image Software  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must provide software emulation of KF-9100

Must translate high resolution mono images to low resolution grey scale images for viewing on VGA or EGA

**SUGGESTED/LIST PRICE:** \$99.00

**RECOMMENDED MAKE/MODEL:** Kofax KF-910

**Comments:** Purchase with KIPP system to obtain best price.

**Rep/Distributor:** Kofax Image Products

**Contact:** Ken Braun **Telephone:** 714 727-3144

**Price:** \$99.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.



**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software

**COMPONENT:** DOS Multitasking Operating System with  
Mouse Driven Graphical Interface

**QUANTITY REQUIRED:** 2

**PERFORMANCE/INTERFACE REQUIREMENTS:**  
Must allow applications up to 16 Meg of memory  
Must allow concurrent application execution without memory  
swapping  
Must be able to run applications in protected mode  
Must provide a graphic mode desktop environment  
Must provide cut and paste in text and graphic modes  
Must provide mouse support

**SUGGETED/LIST PRICE:** \$195.00 each/\$390.00 total

**RECOMMENDED MAKE/MODEL:** Microsoft Windows 3.0 or later

**Comments:** Premier DOS-based multitasking  
environment. Expected to be bundled with  
most 80386 Pc's when available at no  
cost. Will require at least 2 Mbytes of  
RAM. Touted to have dynamic linking and  
unlinking of network file resources.

**Rep/Distributor:** Programmer's Paradise

**Contact:** Amelia Robinson **Telephone:** 201 389-9228

**Price:** \$125.00 each (estimated)/\$250.00 total

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** Windows Application Package  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

- Must provide a Windows 3.0 or later application environment
- Must provide a code management facility
- Must include an Expert system to generate Windows programs
- Must interface to Windows Software Development Kit
- Must control compilations
- Must define program segmentation
- Must use dynamic link libraries (DLL)
- Must generate program code for Microsoft 'C' compiler supplied with Windows 3.0 development kit

**SUGGESTED/LIST PRICE:** \$795.00

**RECOMMENDED MAKE/MODEL:** Caseworks CASE:W 1.10

**Comments:** Automates Windows Development from design to automatic code ('C') generation. Provides structured design facilitating maintenance and revision. Requires WinSDK.

**Rep/Distributor:** Programmer's Paradise

**Contact:** Amelia Robinson **Telephone:** 201 389-9228

**Price:** \$759.00

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** Power Organizer/Surge Protector  
**QUANTITY REQUIRED:** 3

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must have 5 AC outlets  
Must have 2 RJ-11 jacks  
Must be UL listed

**SUGGESTED/LIST PRICE:** \$159.95/each/\$479.85 total  
**RECOMMENDED MAKE/MODEL:** Kensington MasterPiece Plus #40656  
**Comments:** Good price/performance  
**Rep/Distributor:** Elek-Tek  
**Contact:** Telephone: 800 395-1000  
**Price:** \$99.00 each/\$297.00 total  
**ALTERNATIVE MAKE/MODEL:** Power Director #536697/Inmac

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** Computer Desk & Table  
**QUANTITY REQUIRED:** 3

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must have an adjustable keyboard

Must have 48" wide workspace

Must have adjustable height in 3/4" increments from a minimum of 25" up to a minimum of 20 1/2" high

**SUGGESTED/LIST PRICE:** \$272.00 each/\$816.00 total

**RECOMMENDED MAKE/MODEL:** YR9072 and YR9078

**Comments:**

**Rep/Distributor:** Misco

**Contact:** **Telephone:** 800 876-4726

**Price:** \$272.00 each/\$816.00 total

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software

**COMPONENT:** Laser Printer Table & Scanner Table

**QUANTITY REQUIRED:** 3

**PERFORMANCE/INTERFACE REQUIREMENTS:**  
Must be 18" wide by 24" deep by 27" high

**SUGGESTED/LIST PRICE:** \$149.00 each/\$447.00 total

**RECOMMENDED MAKE/MODEL:** YR8995

**Comments:**

**Rep/Distributor:** Misco

**Contact:** Telephone: 800 876-4726

**Price:** \$149.00 each/\$447.00 total

**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** D - LAN and Software**COMPONENT:** Computer Desk Chair**QUANTITY REQUIRED:** 3**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must have height adjustment, contured back and seat, lateral backrest adjustment, 5-legged base with casters, waterfall design seat, mechanical seat and back tilt adjustment

**SUGGESTED/LIST PRICE:** \$189.00 each/arm kit 49.95 each**RECOMMENDED MAKE/MODEL:** YR9395/arm kit YR9399**Comments:** Gray color has besn selected**Rep/Distributor:** Misco**Contact:** **Telephone:** 800 876-4726**Price:** \$616.95 total with one arm kit**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION****SUB-SYSTEM:** D - LAN and Software**COMPONENT:** Windows 3.0 Software Development Kit**QUANTITY REQUIRED:** 1**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must be actual Microsoft development kit for 3.0 or later

Must include software libraries and manuals

Must include current Microsoft 'C' complier

**SUGGESTED/LIST PRICE:** \$500.00**RECOMMENDED MAKE/MODEL:** Microsoft Windows WinSDK**Comments:** Required by CASE:W**Rep/Distributor:** Programmer's Paradise**Contact:** Amelia Robinson **Telephone:** 201 389-9228**Price:** \$319.00**ALTERNATIVE MAKE/MODEL:** None has been identified.

**DDS PROTOTYPE COMPONENT SPECIFICATION**

**SUB-SYSTEM:** D - LAN and Software  
**COMPONENT:** LAN Management Software  
**QUANTITY REQUIRED:** 1

**PERFORMANCE/INTERFACE REQUIREMENTS:**

Must run under Windows 3.0 or later  
Must work with Novell 386 3.1 or later  
Must support a mouse interface  
Must provide security and encryption  
Must provide centralized administration  
Must be able to send/receive Netware console and user messages from within any Windows application  
Must include a print manager to support HP Laserjet printers

**SUGGESTED/LIST PRICE:** \$595.00

**RECOMMENDED MAKE/MODEL:** Automated Design Windows Workstation

**Comments:** Provides Netware 386 and Windows 3.0 or later integration. Price must include at least 4-user use.

**Rep/Distributor:** Automated Design Systems

**Contact:** Telephone: 404 394-2191

**Price:** possible GSA price

**ALTERNATIVE MAKE/MODEL:** None has been identified.



## **SIGNATURE PAGE — DDS PROTOTYPE SYSTEM**

This document has been reviewed and concurrence in support of this plan and the availability of funds is acknowledged. Any special conditions or constraints to the designated actions are indicated in the appropriate paragraphs of this document or in the Review Item Description page, which follows.

### **CONCURRENCE**

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Code NTT, Chief,  
Program & Analysis Branch

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Date

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Code NTT, Director,  
Scientific & Technical Information Division

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Date

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Code DT, Chief,  
Agency Applications

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Date

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Code DT, Manager,  
ADP Procurement, Plans and Policy

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Date

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Code DT, Deputy Director,  
ADP/T User Support

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Date

### **RECOMMENDED FOR APPROVAL/APPROVED**

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Ronald W. Collison, Director  
Headquarters Information Systems and  
Technologies Division

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Date

## **NASA REVIEW ITEM DESCRIPTION**